

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “cut end portion”, “plasma processing chamber” must be shown or the features canceled from the claims. No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: See drawing objections.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 16, 17, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch; Michael D. et al. (US 6,192,827 B1) in view of Osaka et al (JP11-037315). Welch teaches a deposit shield (50; Figure 3B; “chamber liner”) arranged in a vacuum processing chamber (24; Figure 1; column 4; lines 10-21) in which plasma processing is to be performed on a substrate to be processed, and covering an inner side surface of the vacuum processing chamber (24; Figure 1; column 4; lines 10-21) to inhibit the inner side surface from being exposed to plasma, the deposit shield (50; Figure 3B; “chamber liner”) comprising: an inner surface (plasma facing surface of 50; Figure 3B; “chamber liner”) facing the vacuum processing chamber (24; Figure 1; column 4; lines 10-21) and formed into a smooth curved side surface; a notch portion (94,96; Figure 9,10) formed to face a gate (222; Figure 9/10) via which the substrate to be processed is loaded or unloaded; a shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) having an end surface formed with a similar shape as the notch portion (94,96; Figure 9,10), the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) having an inner surface facing the vacuum processing chamber (24; Figure 1;

column 4; lines 10-21) that is formed to make a same curved surface as the curved side surface of the deposit shield (50; Figure 3B; "chamber liner"); a raising/lowering portion (all elements except 60; Figure 6) which raises/lowers the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10); the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) and the inner surface (plasma facing surface of 50; Figure 3B; "chamber liner") of the deposit shield (50; Figure 3B; "chamber liner") make a similar curved surface so that the inner surfaces (plasma facing surface of 50; Figure 3B; "chamber liner") are formed on a same plane, whereby a uniformity in density of plasma generated in the plasma processing is maintained – claim 16

Welch further teaches:

- i. The deposit shield (50; Figure 3B; "chamber liner") according to claim 16, wherein: a cut end portion (terminating arms of 94,96; Figure 9,10) of the notch portion (94,96; Figure 9,10) and the end surface of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) facing the notch portion (94,96; Figure 9,10) have respective L-shaped step portions (L-shape of 94,96; Figure 9,10) which are fitted to each other; a portion of the L-shaped cut end step portion (L-shape of 94,96; Figure 9,10) formed adjacent the vacuum processing chamber (24; Figure 1; column 4; lines 10-21) extends further towards the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) than a portion of the L-shaped cut end portion (terminating arms of 94,96; Figure 9,10) formed adjacent a plasma processing chamber (24; Figure 1; column 4; lines 10-21); a portion of the L-shaped end face step portion formed adjacent the plasma processing chamber extends further towards the cut end portion (terminating arms of

94,96; Figure 9,10) than a portion of the end face formed adjacent the vacuum processing chamber (24; Figure 1; column 4; lines 10-21); when the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) and notch (94,96; Figure 9,10) are fitted; and plasma generated in the processing chamber is prevented from leaking between the notch portion (94,96; Figure 9,10) and the end face of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) - claim 20

- ii. The deposit shield (50; Figure 3B; "chamber liner") according to Claim 16, wherein a cut end portion (terminating arms of 94,96; Figure 9,10) of the notch portion (94,96; Figure 9,10) and the end surface of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) have respective complementary step portions, as claimed by claim 22

Welch does not teach:

- i. an O-ring fitted in an inner surface (plasma facing surface of 50; Figure 3B; "chamber liner") side of an end surface of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) that meets facing the notch portion (94,96; Figure 9,10); and a spiral seal fitted in an outer surface side thereof; wherein when the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) is fitted to the notch portion (94,96; Figure 9,10) – claim 16
- ii. The deposit shield (50; Figure 3B; "chamber liner") according to claim 16, wherein the spiral seal electrically connects the deposit shield (50; Figure 3B; "chamber liner") and the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) to each other at a same ground potential, thereby preventing the plasma from detouring around to

an outside of the deposit shield (50; Figure 3B; “chamber liner”) from a gap between the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) and the notch portion (94,96; Figure 9,10) that meet, and the O-ring prevents particles generated from the spiral seal from scattering towards an inner side of the deposit shield (50; Figure 3B; “chamber liner”), as claimed by claim 17

- iii. The deposit shield (50; Figure 3B; “chamber liner”) according to Claim 16, wherein the end surface of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) configured to hold the O-ring is substantially perpendicular to the inner surface (plasma facing surface of 50; Figure 3B; “chamber liner”) of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10), as claimed by claim 21
- iv. at least the spiral seal of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) is brought into contact with the end face of the notch portion (94,96; Figure 9,10) – claim 20
- v. The deposit shield (50; Figure 3B; “chamber liner”) according to Claim 22, wherein the respective complementary step portions (L-shape of 94,96; Figure 9,10) include a plurality of portions substantially perpendicular to the inner surfaces (plasma facing surface of 50; Figure 3B; “chamber liner”) of the deposit shield (50; Figure 3B; “chamber liner”) and shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10), and wherein the respective complementary step portions (L-shape of 94,96; Figure 9,10) further includes a portion substantially parallel to the inner surfaces (plasma facing surface of 50; Figure 3B; “chamber liner”) of the deposit shield (50; Figure 3B; “chamber liner”) and shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10),

whereby plasma generated in the processing chamber is prevented from leaking between the notch portion (94,96; Figure 9,10) and the end surface of the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10), as claimed by claim 23

- vi. The deposit shield according to Claim 20, wherein only the spiral seal of the shutter is brought into contact with the end face of the notch portion (94,96; Figure 9,10), as claimed by claim 24

Osaka teaches a gate valve shutter (32) with a groove (32/33 contour; Figure 2, 5) for fitting an o-ring (33 – see corresponding element on the other side of 32). The groove is shown to have a cross section having a square outer periphery.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Welch to add shape-compliant grooves around Welch's shutter to thereby accommodate an O-ring as taught by Osaka, further, to reproduce Welch's

Motivation for Welch to add shape-compliant grooves around Welch's shutter to thereby accommodate an O-ring as taught by Osaka is to provide for a better hermetic seal between Welch's gate valve and seat therefore as taught by Osaka ("[Description of the Prior ART]"; Machine Translation). It is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04).

5. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Welch; Michael D. et al. (US 6,192,827 B1) and Osaka et al (JP11-037315) in view of Hamrah et al (USPat. 5,242,538). Welch, and Osaka are discussed above. Welch, and Osaka do not teach:

- i. a disk-like exhaust plate arranged around the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10), wherein when the shutter (60; Figure 2; column 4; lines

22-40; not numbered in Figure 9,10) is raised, the shutter (60; Figure 2; column 4; lines 22-40; not numbered in Figure 9,10) of the deposit shield (50; Figure 3B; “chamber liner”) and the exhaust plate are brought into contact to each other to be electrically connected to each other, as claimed by claim 18

Hamrah teaches a similar plasma processing apparatus (Figure 2) including a disk-shaped evacuation plate (96; Figure 2; column 3, lines 14-29) disposed around the stage (70).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a disk-shaped evacuation plate disposed around Welch’s support stage as taught by Hamrah.

Motivation to add a disk-shaped evacuation plate disposed around Welch’s support stage is to direct exhaust flow as taught by Hamrah (column 3, lines 14-29).

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Welch; Michael D. et al. (US 6,192,827 B1) and Osaka et al (JP11-037315) in view of Steger et al (USPat. 5,788,799). Welch and Osaka are discussed above. Welch and Osaka do not teach the deposit shield (50; Figure 3B; “chamber liner”) according to claim 11, wherein the deposit shield (50; Figure 3B; “chamber liner”) and the shutter (60; Figure 2; column 4; lines 22-40) include respective heating mechanisms, as claimed by claim 19

Steger teaches a similar plasma apparatus (Figure 1) including a chamber liner (102; column 6, lines 18-29) comprising a heating mechanism (110, Figure 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a heater in Welch’s liner as taught by Steger.

Motivation to add a heater in Welch's liner as taught by Steger is to provide for thermal protection of the liner (column 6, lines 18-29).

Response to Arguments

7. Applicant's arguments filed February 28, 2008 have been fully considered but they are not persuasive.

8. Applicant states:

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Instead, Welch best shows in Fig. 10, *a large gap exists between the liner wall portions 94 and 96 and the door 60*. That is, a large gap exists between the door and the inner surfaces that face the interior of the processing chamber. Therefore, when the door 60 is in the open position as shown in Fig. 9 or in the closed position shown in Fig. 10, an inner surface of the door 60 and inner surfaces of portions 94 and 96 are not formed on the same plane as set forth in the claimed invention. The deposit shield of one or more examples of the present invention has such a structure that when the shutter is closed to be fitted with the notch portion of the deposit shield, minimal irregularity is made in the inner wall surface of the deposit shield, creating a smooth plane, as best shown in Figs. 8B and 9.

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In response to Applicant's drawing scale argument, *proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale*. Because the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on

measurement of the drawing features are of little value. However, the description of the article pictured can be relied on, in combination with the drawings, for what they would reasonably teach one of ordinary skill in the art. (In re Wright, 193 USPQ 332 (CCPA 1977). MPEP 2125.

9. Applicant states:

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A function of the deposit shield is to inhibit the irregularity on the surface to be exposed to plasma, and thus the density of plasma is made uniform. As such, Claim 16 recites that when the end surface of the shutter is fitted to the notch portion of the deposit shield, the similar curved inner surfaces of the shutter and deposit shield are formed on a same plane. This feature is not taught or suggested in the applied art as clearly shown in for example Fig. 10 of Welch. Osaka does not make up for the deficiencies of Welch discussed above.

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And..

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Additionally, due to the L-shaped portions, this shape prevents metal particles generated from the spiral seal from dispersing to the processing area. The above-described advantageous effect of the present invention cannot be obtained even if the applied art is combined together.

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In response, when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Applicant states:

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Further, the applied art does not teach or suggest a *cut end portion* of the notch portion and the end surface of the shutter facing the notch portion have respective L-shaped step portions which are fitted to each other, as recited in Claim 20. Please see Fig. 9 of the present specification. Claim 20 further recites that the portion of the cut end L-shaped formed adjacent the vacuum processing chamber extends further towards the shutter than the other portion of the cut end L-shape formed adjacent a plasma processing chamber.

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In response, the Examiner notes that Applicant has not provided a drawing reference to support the “cut end portion” structural feature. As a result, the Examiner cannot ascertain the equivalence in the prior art. The Examiner has, however, maintained the rejection based on the structural and functional similarities between the Welch and Osaka apparatus and Applicant’s Figure 8A,B.

Conclusion

10. Applicant’s amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792